

Keystone NTC & PTC thermistors

&

**probe
assemblies**

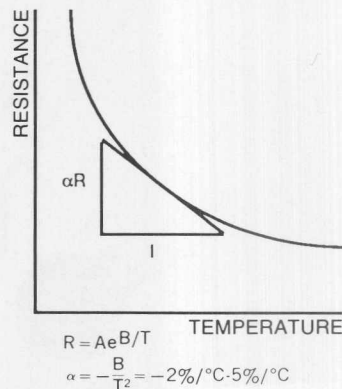




NTC THERMISTOR CURVE

The resistance temperature characteristic for a negative temperature coefficient (NTC) thermistor is illustrated in a general manner by the figure at right. This large negative temperature coefficient of resistance enables the thermistor to become a very versatile solid state component. A few of the many useful tasks performed by thermistors are outlined on this page.

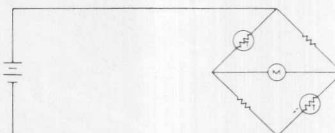
The resistance temperature plot for a negative temperature coefficient (NTC) thermistor is approximately exponential and is reasonably well described by the relationship $R = Ae^{B/T}$ (1). The temperature coefficient (α) of a thermistor can be derived from the expression at right and is defined as $\alpha = \frac{dR}{dT} \frac{1}{R}$ (2). If the formula (1) for R is differentiated and substituted into equation (2) the algebraic equation for temperature coefficient becomes: $\alpha = -\frac{B}{T^2}$. The graph gives a typical resistance temperature plot along with a graphical interpretation of α .



NTC THERMISTOR APPLICATIONS

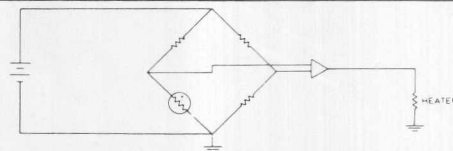
Low-Cost Temperature Measurement

The high sensitivity of a thermistor makes it an ideal candidate for low-cost temperature measurement. Illustrated is a circuit utilizing two thermistors in a bridge circuit. The addition of the second thermistor makes this circuit twice as sensitive and permits the use of a lower sensitivity meter. A single thermistor could also be used, with the other thermistor being replaced by a fixed resistor.



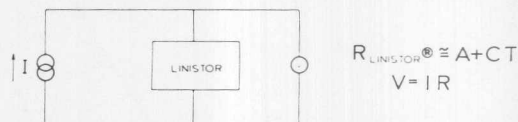
Precision Temperature Control

A thermistor used in conjunction with a controller that can be on, off, proportioning, integral, derivative or any of the other modern control features. Using thermistors, temperatures have been controlled to one-thousandth of one degree.



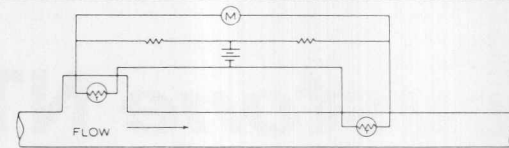
Linearized Temperature Measurement

Keystone developed the Linistor® to provide a linear change in resistance with a change in temperature. Because of its linear characteristics, a formula of the form $Y = mx + b$ can be employed to relate the resistance of the device to its temperature. Depicted is a temperature measurement circuit employing a constant current source and a Linistor with the output voltage which is proportional to temperature across the Linistor.



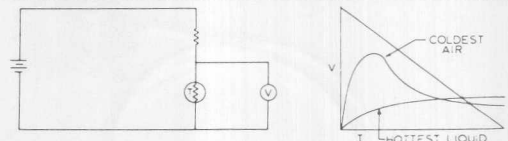
Flow Measurement Utilizing a Self-Heated Thermistor

Flow measurement takes advantage of a variable dissipation constant of a thermistor under different environmental conditions. In this circuit both thermistors are self-heated, with one in the path of flow and the other being shielded from the flow. If the flow rate is large, the thermistor in path of the flow will be much cooler than the other thermistor and the output signal will be large. If flow is not as rapid, heat will not be carried away from the thermistor in the flow path as rapidly and the output signal will be smaller.



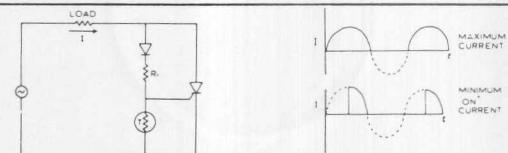
Liquid Level

Liquid level applications take advantage of the difference in dissipation constant between a liquid and a gas. Typically, the dissipation constant varies by a factor of 4 from a gas to a liquid. This large variation enables thermistors to serve as liquid level sensors over a wide range of temperatures.

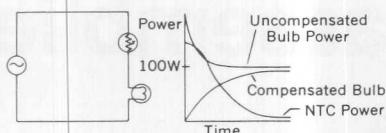


Low-Cost Temperature Control

A thermistor in conjunction with an SCR provides a low-cost proportional temperature controller. As the resistance of the thermistor decreases a larger voltage is required to fire the SCR. In the above circuit conduction, angles from 90° to 180° can be achieved; therefore, the minimum "on" current will be 50% of the maximum "on" current.

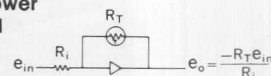


Surge Protection



The above circuits depict a thermistor acting as a shock absorber for a light bulb. When the circuit is energized a high percentage of the available voltage is dropped across the thermistor. As the thermistor heats, its resistance drops and more voltage is applied to the light bulb. Using this soft start technique, many hours of life can be added to an incandescent lamp. This same surge protection principle also applies to other applications.

Automatic Power Level Control

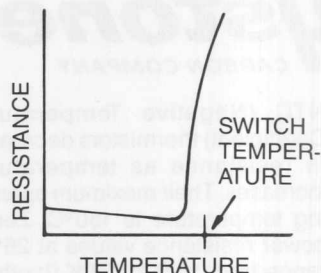


Automatic level control is accomplished in the above circuit by heating the thermistor with the output of the amplifier. As the output of the amplifier increases, the thermistor is heated to a higher temperature, which reduces the gain of the stage. This circuit responds to average power levels. The time constant is essentially determined by the mass of the thermistor.



PTC THERMISTOR CURVE

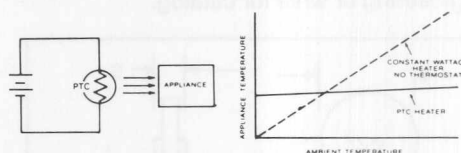
Like most semiconductors, the PTC has a slight negative temperature coefficient over the majority of its normal operating temperature region. Above the Curie temperature of the material, however, rapid changes in the ferroelectric properties of the ceramic cause a sharp rise in resistance—usually several orders of magnitude. The resulting resistance/temperature characteristic is shown in this curve.



PTC THERMISTOR APPLICATIONS

Combination Heater-Thermostat

PTC thermistors provide an economical method of temperature control by combining the function of the heater and thermostat in one ceramic pellet. This thermostatic action is accomplished by the steep PTC characteristic. As the ambient temperature rises, the resistance of the PTC is increased, thus reducing the input power to the circuit maintaining a relatively constant temperature.

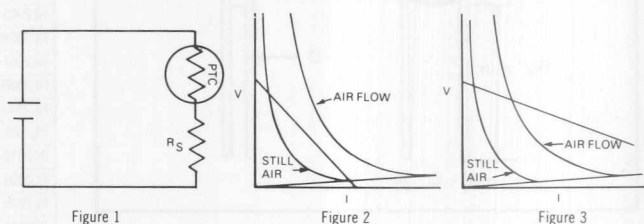


Liquid Level and Air Flow

Air flow and liquid level sensing applications are based on the principle that the dissipation constant of a PTC changes with different ambient conditions. The net result of this changing dissipation constant is the greater heat losses either lower PTC temperatures or increase the power required to maintain a given temperature.

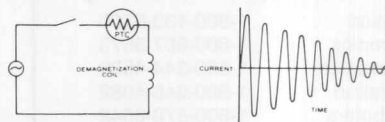
Depicted in Figure 1 is a typical air flow or liquid level sensing circuit. The series resistor could be a relay if the change in dissipation constant is large enough to provide a sufficient resistance change for reliable operation. Also shown are the equations relating PTC characteristics to circuit performance.

In Figure 2, the series resistor is relatively large and in the higher dissipation medium the PTC is cooled below its switch temperature. If the value of R_S is relatively small, conditions portrayed in Figure 3 emerge. The value chosen for the series resistor will depend on the demands of a given application. Increases in ambient temperature will cause the voltage current plots to move to the left or closer to the voltage axis and decreases will bring about opposite results.



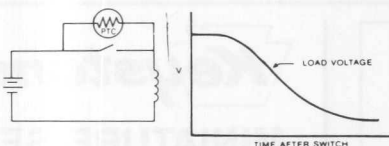
Automatic Degaussing

When the switch on the circuit at right is closed, a high percentage of the line voltage is impressed across the demagnetization coil. Within a short period of time, the PTC self-heats, switching from a low resistance level to a high resistance, and thereby decreasing the demagnetization coil current to near zero. The length of time for this switching action to occur is a function of the power applied to the PTC and its thermal inertia.



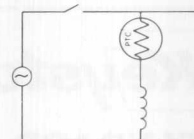
Arc Suppression

In the illustrations at right the PTC switches from a low resistance to a high resistance when the switch is opened. The low resistance of the PTC provides effective arc suppression, and the subsequent PTC switching action transfers essentially all of the power supply voltage from the inductive load to the PTC element.



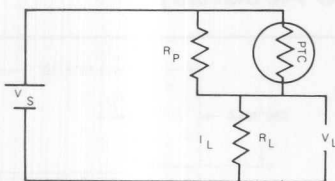
Motor Starting

In the circuit at right the PTC thermistor replaces the troublesome starting switch in a single-phase motor. When the circuit is energized the PTC has a low resistance and permits most of the line voltage to be applied to the starter winding. As the motor starts, the PTC heats up, thus rapidly changing from a low resistance device to a high resistance unit. And then the steady state power applied to the PTC is very low causing the current through the starting winding to be negligible.



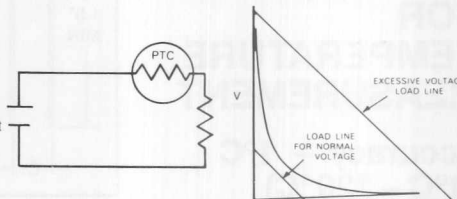
Constant Current

The nearly constant temperature of a self-heated PTC results in a reduction in current through the unit as the voltage across the PTC is increased. By connecting the approximately constant temperature PTC in parallel with a resistor, nearly constant load current can be obtained over a broad voltage range.



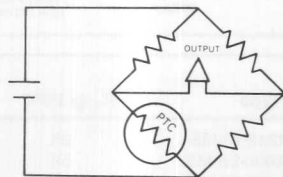
Temperature Sensing in Battery Packs, Electric Motors and Power Semiconductors

PTC's provide fail-safe protection (i.e., an open wire appears as an overtemperature condition) against overtemperature due to the large positive temperature coefficient of resistance of the device.



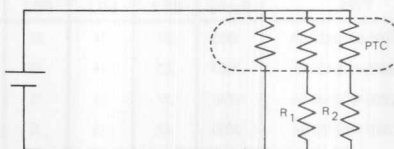
Overvoltage Protection

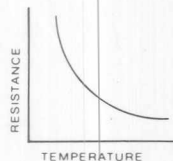
Under normal operating conditions, the PTC experiences a relatively insignificant amount of self-heating. However, if a fault voltage of significant magnitude occurs, the PTC heats and results in a reduction in current through the circuit. One common application of a PTC in this operating mode is the protection of precision resistors in meters subjected to accidental overvoltages.



Multiple Time Delays

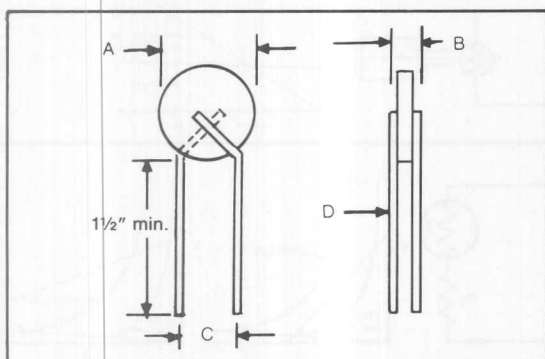
The circuit at right illustrates a single (three section) PTC being employed as a two-stage time delay. The third section acts as an auxiliary heater, supplementing the joule heat generated in the other sections and thereby creating significantly shorter time delays than would be possible without altering other circuit parameters.





NTC (Negative Temperature Coefficient) thermistors decrease in resistance as temperature increases. Their maximum operating temperature is 150°C. Zero-power resistance values at 25°C range from 10 Ω to 250K Ω ; other values upon request. Disc thermistors are available with various coatings, lead styles, and resistance tolerances. Contact Keystone Thermistor Engineering or write for catalog.

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Keystone Thermistors are distributed by

Allied Electronics	1-800-433-5700
Newark Electronics	1-800-367-3573
Digi-Key Corporation	1-800-344-4539
Dexter Corporation	1-800-345-4082
Summit Distributors	1-800-678-6648

DISC TYPE THERMISTORS WITH CROSSED LEADS

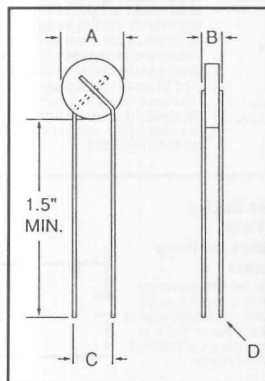
KCC TYPE	R ₀ @ 25°C (Ω)	Tol. ±%	A (in.)	B (in.)	C (in.)	D (AWG)	Dissipation Constant (mW/°C)	Resist.† Ratio	Temp. Coef. @ 25°C (%/°C)
RL1004-65.6-59-D1	100	20	0.110	0.120	0.100	26	2.5	5.6	-3.42
RL1003-312-73-D1	500	10	0.110	0.110	0.100	26	2.5	6.9	-3.83
RL1007-624-73-D1	1,000	10	0.110	0.150	0.100	26	2.8	6.9	-3.83
RL1003-1157-95-D1	2,000	10	0.110	0.110	0.100	26	2.8	9.2	-4.43
RL1003-1746-97-D1	3,000	10	0.110	0.110	0.100	26	2.5	9.1	-4.40
RL1004-2910-97-D1	5,000	10	0.110	0.120	0.100	26	2.5	9.1	-4.40
RL1009-5820-97-D1	10,000	10	0.110	0.170	0.100	26	3.0	9.1	-4.40
RL1005-5744-103-D1	10,000	10	0.110	0.130	0.100	26	2.5	9.6	-4.49
RL1007-13.8K-120-D1	25,000	10	0.110	0.150	0.100	26	2.8	11.4	-4.84
RL1003-26.7K-140-D1	50,000	10	0.110	0.110	0.100	26	2.5	12.9	-5.08
RL1006-53.4K-140-D1	100,000	10	0.110	0.140	0.100	26	2.7	12.9	-5.08
RL1004-104.7K-155-D1	200,000	10	0.110	0.120	0.100	26	2.5	13.8	-5.23
RL1006-135.2K-138-D1	250,000	10	0.110	0.140	0.100	26	2.7	12.1	-4.96
RL2004-16.4-59-D1	25	20	0.220	0.130	0.156	24	6.5	5.6	-3.42
RL2007-32.8-59-D1	50	20	0.220	0.160	0.156	24	6.5	5.6	-3.42
RL2003-62.4-73-D1	100	10	0.220	0.120	0.156	24	6.5	6.9	-3.83
RL2006-125-73-D1	200	10	0.220	0.150	0.156	24	6.5	6.9	-3.83
RL2008-187-73-D1	300	10	0.220	0.170	0.156	24	6.5	6.9	-3.83
RL2003-289-95-D1	500	10	0.220	0.120	0.156	24	6.0	9.2	-4.43
RL2004-582-97-D1	1,000	10	0.220	0.130	0.156	24	6.5	9.1	-4.40
RL2007-1164-97-D1	2,000	10	0.220	0.160	0.156	24	6.5	9.1	-4.40
RL2006-1600-103-D1	2,786	10	0.220	0.150	0.156	24	6.5	9.6	-4.49
RL2005-2203-120-D1	4,000	10	0.220	0.140	0.156	24	6.5	11.4	-4.84
RL2006-2753-120-D1	5,000	10	0.220	0.150	0.156	24	6.5	11.4	-4.84
RL2012-5506-120-D1	10,000	10	0.220	0.210	0.156	24	7.2	11.4	-4.84
RL2006-13.3K-140-D1	25,000	10	0.220	0.150	0.156	24	6.5	12.9	-5.08
RL2005-27K-138-D1	50,000	10	0.220	0.140	0.156	24	6.5	12.1	-4.96
RL2008-52.3K-155-D1	100,000	10	0.220	0.170	0.156	24	6.5	13.8	-5.23
RL3004-6.56-59-D1	10	20	0.320	0.130	0.250	24	7.0	5.6	-3.42
RL3504-31.2-73-D1	50	10	0.370	0.130	0.250	24	7.5	6.9	-3.83
RL3006-59.4-85-D1	100	10	0.320	0.150	0.250	24	7.2	8.4	-4.23
RL3004-144-95-D1	250	10	0.320	0.130	0.250	24	7.0	9.2	-4.43
RL3004-291-97-D1	500	10	0.320	0.130	0.250	24	7.0	9.1	-4.40
RL3005-574-103-D1	1,000	10	0.320	0.130	0.250	24	7.0	9.6	-4.49

†Resistance Ratio: Ratio of zero-power resistance @ 0°C to zero-power resistance @ 50°C.



STANDARD THERMISTORS FOR TEMPERATURE MEASUREMENT

Accuracy $\pm 1^\circ\text{C}$
(0°C - 120°C)



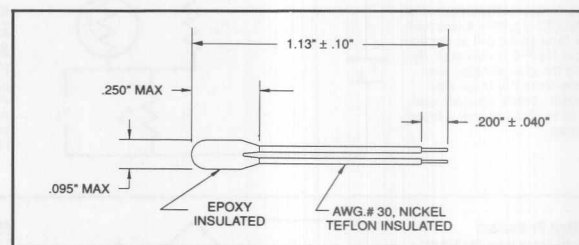
TYPE	R ₂₅ °C	A MAX. (IN.)	B MAX. (IN.)	C REF. (IN.)	D AWG. (DIA.)	D.C. mW/°C	T.C. SEC.
RL3005-574.0-103-SA	1000	.32	.14	.25	24 (.020)	3.5	30
RL2005-1148-103-SA	2000	.22	.14	.15	24 (.020)	2.5	20
RL2006-1600-103-SA	2786	.22	.15	.15	24 (.020)	2.5	20
RL2007-1723-103-SA	3000	.22	.16	.15	24 (.020)	2.5	20
RL2008-2010-103-SA	3500	.22	.17	.15	24 (.020)	2.5	20
RL1003-2871-103-SA	5000	.11	.11	.10	26 (.016)	1.0	10
RL1004-4019-103-SA	7000	.11	.12	.10	26 (.016)	1.0	10
RL1005-5744-103-SA	10000	.11	.13	.10	26 (.016)	1.0	10

Operating Range: -50°C to +150°C
D.C.: Dissipation Constant (mW/°C)

T.C.: Time Constant (Seconds)
*Optional temperature accuracies are available upon request.



MINIATURE SENSORS 1°C Accuracy

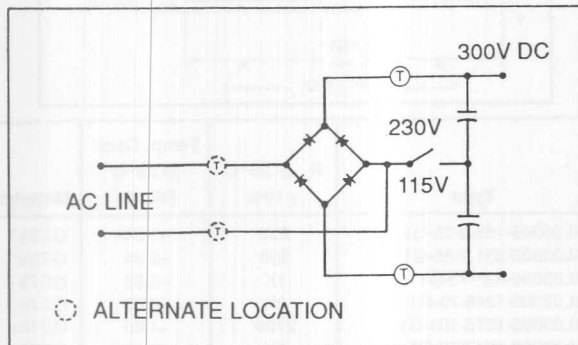


Type	R ₀ @ 25°C	Temp. Coef. %/°C @ 25°C	Material
RL0503-1248-73-MS	2K	-3.83	MS73
RL0503-2890-95-MS	5K	-4.43	MS95
RL0503-5820-97-MS	10K	-4.40	MS97A
RL0503-17.56K-96-MS	30K	-4.32	MS96
RL0503-27.53K-120-MS	50K	-4.84	MS120
RL0503-55.36K-122-MS	100K	-4.78	MS122

Temperature Accuracy: $\pm 1^\circ\text{C}$ @ 25°C
Dissipation Constant: 1.4 mW/°C

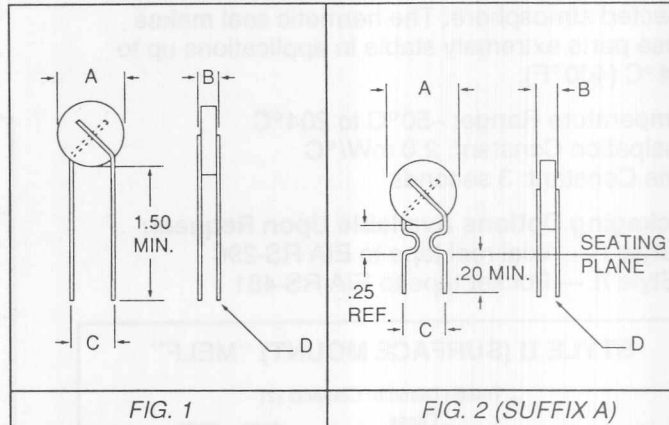
Time Constant: 15 sec.
Operating Range: -50°C to +150°C

Keystone INRUSH CURRENT LIMITERS



The circuit diagram above displays a typical way to limit inrush current.

Protection against extremely high peak inrush current, especially in AC/DC switching power supplies, is now available with Keystone Inrush Current Limiters. These special NTC thermistors effectively control surge currents because the thermal time constant of the current limiter is longer than the electrical time constant (RC) of the thermistor and the capacitor.



All inrush current limiters are insulated with a protective coating. Optional lead designs available upon request.

Note: For Figure 2 design add 'A' suffix to type.
(Example: CL-10A.)

Type Fig. 1	R ₀ @ 25°C ±25% (ohms)	Max.* Steady State Current amps (RMS)	A max. (in.)	B max. (in.)	C ref. (in.)	D (AWG)	C _x (max.)** μ farads		Eqn. Const. for Res. Under Load***			Approx. Res. Under Load at % Max. Rated Current				Diss. Const. (mW/°C)	Time Const. (sec.)
							@ 120 VAC	@ 240 VAC	X	Y	Current Range Min. I./Max. I	25%	50%	75%	100%		
CL-10	0.7	12	0.77	0.22	0.328	18	8200	2000	0.50	-1.18	4.0 ≤ I ≤ 12	.14	.06	.04	.02	25	100
CL-20	1.3	8	0.55	0.21	0.328	18	2400	600	0.60	-1.25	3.0 ≤ I ≤ 8.0	.25	.09	.06	.04	15	60
CL-30	2.5	8	0.77	0.22	0.328	18	6000	1500	0.81	-1.25	2.5 ≤ I ≤ 8.0	.34	.14	.09	.06	25	100
CL-40	5	6	0.77	0.22	0.328	18	5200	1300	1.09	-1.27	1.5 ≤ I ≤ 6.0	.65	.27	.16	.11	25	100
CL-50	7	5	0.77	0.26	0.328	18	5000	1250	1.28	-1.27	1.5 ≤ I ≤ 5.0	.96	.40	.24	.16	25	120
CL-60	10	5	0.77	0.22	0.328	18	5000	1250	1.45	-1.30	1.2 ≤ I ≤ 5.0	1.09	.44	.26	.18	25	100
CL-70	16	4	0.77	0.22	0.328	18	5000	1250	1.55	-1.26	1.0 ≤ I ≤ 4.0	1.55	.65	.39	.27	25	100
CL-80	47	3	0.77	0.22	0.328	18	5000	1250	2.03	-1.29	0.5 ≤ I ≤ 3.0	2.94	1.20	.71	.49	25	100
CL-90	120	2	0.93	0.22	0.328	18	5000	1250	3.04	-1.36	0.5 ≤ I ≤ 2.0	7.80	3.04	1.75	1.18	30	120
CL-100	0.5	16	0.93	0.22	0.328	18	12000	3000	0.44	-1.12	4.0 ≤ I ≤ 16	.09	.04	.03	.02	30	120
CL-110	10	3.2	0.40	0.17	0.250	24	600	150	0.83	-1.29	0.7 ≤ I ≤ 3.2	1.10	.45	.27	.18	8	30
CL-120	10	1.7	0.40	0.17	0.250	24	600	150	0.61	-1.09	0.4 ≤ I ≤ 1.7	1.55	.73	.46	.34	4	90
CL-130	50	1.6	0.45	0.17	0.250	24	600	150	1.45	-1.38	0.4 ≤ I ≤ 1.6	5.13	1.97	1.13	.75	8	30
CL-140	50	1.1	0.45	0.17	0.250	24	600	150	1.01	-1.28	0.2 ≤ I ≤ 1.1	5.27	2.17	1.28	.89	4	90
CL-150	5	4.7	0.55	0.18	0.328	22	1600	400	0.81	-1.26	1.0 ≤ I ≤ 4.7	.66	.27	.16	.11	15	110
CL-160	5	2.8	0.55	0.18	0.328	22	1600	400	0.60	-1.05	0.8 ≤ I ≤ 2.8	.87	.42	.27	.20	9	130
CL-170	16	2.7	0.55	0.18	0.328	22	1600	400	1.18	-1.28	0.5 ≤ I ≤ 2.7	1.95	.80	.48	.33	15	110
CL-180	16	1.7	0.55	0.18	0.328	22	1600	400	0.92	-1.18	0.4 ≤ I ≤ 1.7	2.52	1.11	.69	.49	9	130
CL-190	25	2.4	0.55	0.18	0.328	22	800	170	1.33	-1.34	0.5 ≤ I ≤ 2.4	2.63	1.04	.60	.41	15	110
CL-200	25	1.7	0.55	0.18	0.328	22	800	170	0.95	-1.24	0.4 ≤ I ≤ 1.7	2.74	1.18	.70	.49	9	130
CL-210	30	1.5	0.40	0.20	0.250	24	600	150	1.02	-1.35	0.3 ≤ I ≤ 1.5	3.83	1.50	.87	.60	8	30

*These values are suggested maximums based on the thermistor in 25°C ambient without air flow.

Current ratings can be increased depending on the magnitude of air flow.

**These ratings are suggested maximums. Contact Keystone Engineering Department for assistance in applications exceeding these ratings.

*** To determine the resistance value under load, use $R = XI^Y$ where X and Y are constants in the table above and I is the current (amps).

Keystone GLASS ENCAPSULATED THERMISTORS

Keystone glass encapsulated NTC thermistors are tiny pellets of thermistor material hermetically sealed in glass bodies with a controlled amount of selected atmosphere. The hermetic seal makes these parts extremely stable in applications up to 204°C (400°F).

Temperature Range: -50°C to 204°C

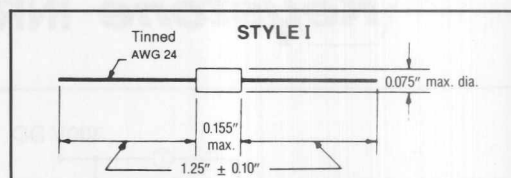
Dissipation Constant: 2.0 mW/°C

Time Constant: 3 seconds

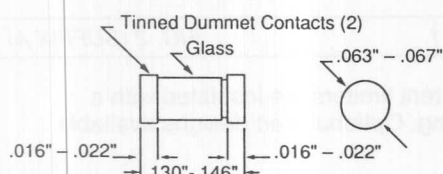
Packaging Options Available Upon Request:

Style I — Axial reel tape to EIA RS-296

Style II — Pocket tape to EIA RS-481



STYLE II (SURFACE MOUNT) "MELF"



NOTE: FOR KCC TYPE FOR STYLE II DELETE AL PREFIX AND ADD G100 SUFFIX.

Type	R ₀ @ 25°C ± 10%	Temp. Coef. @ 25°C (%/°C)	Material
AL03006-165.9-55-G1	250	-3.34	GE55*
AL03006-331.8-55-G1	500	-3.34	GE55*
AL03006-624-73-G1	1K	-3.83	GE73
AL03006-1248-73-G1	2K	-3.83	GE73
AL03006-1576-101-G1	2786	-4.68	GE101
AL03006-1847-76-G1	3K	-3.85	GE76
AL03006-2463-76-G1	4K	-3.85	GE76
AL03006-3079-76-G1	5K	-3.85	GE76
AL03006-5818-97-G1	10K	-4.41	GE97A
AL03006-11.7K-98-G1	20K	-4.34	GE98
AL03006-17.53K-98-G1	30K	-4.34	GE98
AL03006-29.1K-97-G1	50K	-4.32	GE97B
AL03006-58.2K-97-G1	100K	-4.32	GE97B
AL03006-111.3K-123-G1	200K	-4.71	GE123
AL03006-269.8K-138-G1	500K	-4.99	GE138
AL03006-535K-145-G1	1M	-5.07	GE145

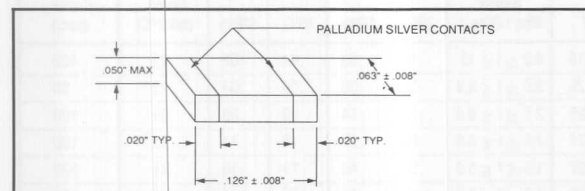
* Maximum operating temperature: 150°C

Keystone SURFACE MOUNT NTC THERMISTORS (EIA 1206 SIZE)

PCB MOUNT:

Dissipation Constant: 5mW/°C

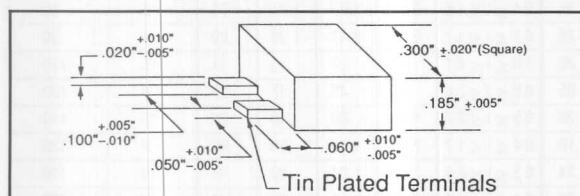
Time Constant: 10 sec.



Type	R ₀ @ 25°C	Temp. Coef. %/°C @ 25°C	Material
060412-103.5-46-C*	150	-3.02	C46
060412-237.9-49-C*	350	-3.14	C49
060412-656.5-57-C*	1K	-3.43	C57
060312-3120-73-C*	5K	-3.83	C73
060412-6011-84-C*	10K	-4.12	C84
060312-11.57K-95-C*	20K	-4.43	C95
060412-17.46K-97-C*	30K	-4.40	C97A
060412-28.71K-103-C*	50K	-4.49	C103
060412-55.06K-120-C*	100K	-4.84	C120
060312-110.7K-122-C*	200K	-4.78	C122

* Part suffix and resistance tolerance @ 25°C: 1 = ± 5%, 2 = ± 10%, 3 = ± 20%.

Keystone SURFACE MOUNT RESETTABLE FUSE



Molded Housing
Transition Temp: 110°C

Dissipation Constant: 10mW/°C
Time Constant: 80 sec.

Type Number	R @ 25°C ± 20% (Ω)	Switch Current (amps)		No Switch Current (amps)		Operating Voltage
		0°C	20°C	30°C	55°C	
PTC-52	10	.38	.35	.22	.19	12
PTC-53	25	.25	.22	.14	.12	12
PTC-54	50	.18	.16	.10	.09	24
PTC-55	100	.13	.12	.07	.06	24

Keystone PTC SURFACE TEMPERATURE SENSORS

Resistance @ 25°C: 150Ω max.

Resistance @ Accuracy Temp.
(± 5°C): 1000Ω

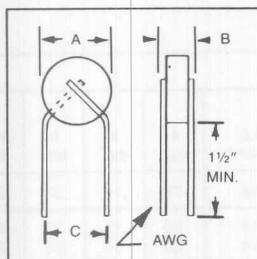
Max. Oper. Temp.: 150°C

Max. Voltage: 30 VDC

Type Number *Add "A" or "E" for design option	Transition Temp. °C	Accuracy Temp. °C (± 5°C)
RL2006-100-30-30-PT*	30	45
RL2006-100-40-30-PT*	40	55
RL2006-100-50-30-PT*	50	65
RL2006-100-60-30-PT*	60	75
RL2006-100-70-30-PT*	70	85
RL2006-100-80-30-PT*	80	95
RL2006-100-90-30-PT*	90	105
RL2006-100-100-30-PT*	100	115
RL2006-100-110-30-PT*	110	125
RL2006-100-120-30-PT*	120	135

PTA PTE





Keystone STANDARD PTC THERMISTORS

The values for Dissipation Constant and Time Constant listed in the table below are reference values. Actual values are a function of mounting, air flow and other factors which affect the PTC's ability to dissipate heat.

Standard PTCs are supplied uninsulated, but can be supplied with an insulation upon request.

Operating Voltage	Type	R @ 25°C ± 30%	Transition Temp °C T _S	Dissipation Constant mW/°C	Time Constant Sec.	"H" Joules/°C	A Max.	B Max.	C Ref.	AWG No.
5	RL6505-5-110-5-PTO	.5	110	18	70	.8	.70	.16	.33	20
12	RL5305-1-120-12-PTO	1.0	120	14	50	.6	.60	.15	.33	20
	RL5305-2-120-12-PTO	2.0	120	14	50	.6	.60	.16	.33	20
	RL5305-2.5-110-12-PTO	2.5	110	14	50	.6	.60	.16	.33	20
	RL4005-5.0-110-12-PTO	5.0	110	10	40	.3	.45	.15	.25	24
	RL3005-10-110-12-PTO	10.0	110	7	35	.2	.35	.15	.25	24
	RL3005-15-110-12-PTO	15.0	110	7	35	.2	.35	.15	.25	24
	RL2006-20-80-12-PTO	20.0	80	6	30	.1	.25	.15	.15	24
25	RL3005-25-110-12-PTO	25.0	110	7	35	.2	.35	.15	.25	24
	RL7008-1.5-110-25-PTO	1.5	110	18	80	1.5	.75	.18	.33	20
	RL5008-3.0-110-25-PTO	3.0	110	14	50	.8	.55	.18	.33	22
	RL5506-5.0-110-25-PTO	5.0	110	14	50	.7	.60	.16	.33	22
	RL4006-10-110-25-PTO	10.0	110	10	40	.4	.45	.17	.25	24
	RL3006-20-120-25-PTO	20.0	120	7	35	.2	.35	.16	.25	22
	RL3006-30-110-25-PTO	30.0	110	7	35	.2	.35	.15	.25	24
	RL3006-50-30-25-PTO	50.0	30	7	35	.2	.35	.15	.25	24
	RL3006-50-40-25-PTO	50.0	40	7	35	.2	.35	.15	.25	24
	RL3006-50-50-25-PTO	50.0	50	7	35	.2	.35	.15	.25	24
	RL3006-50-60-25-PTO	50.0	60	7	35	.2	.35	.15	.25	24
	RL3006-50-70-25-PTO	50.0	70	7	35	.2	.35	.15	.25	24
	RL3006-50-80-25-PTO	50.0	80	7	35	.2	.35	.15	.25	24
	RL3006-50-90-25-PTO	50.0	90	7	35	.2	.35	.15	.25	24
	RL3006-50-100-25-PTO	50.0	100	7	35	.2	.35	.15	.25	24
	RL3006-50-110-25-PTO	50.0	110	7	35	.2	.35	.15	.25	24
	RL3006-50-120-25-PTO	50.0	120	7	35	.2	.35	.15	.25	24
50	RL5506-5-65-50-PTO	5.0	65	14	50	.7	.60	.18	.33	20
	RL5506-5-110-50-PTO	5.0	110	14	50	.7	.60	.16	.33	22
	RL4508-7-110-50-PTO	7.0	110	12	45	.6	.50	.18	.33	22
	RL4006-10-110-50-PTO	10.0	110	10	40	.4	.45	.17	.25	24
	RL4508-15-110-50-PTO	15.0	110	12	45	.6	.50	.18	.33	22
	RL4508-20-110-50-PTO	20.0	110	12	45	.6	.50	.18	.33	22
	RL4010-50-110-50-PTO	50.0	110	12	60	.6	.45	.20	.33	22
	RL2510-100-110-50-PTO	100.0	110	8	40	.2	.30	.22	.15	22
	RL3312-200-110-50-PTO	200.0	110	9	45	.5	.40	.23	.25	20
	RL2010-500-110-50-PTO	500.0	110	7	40	.2	.25	.18	.15	24
120	RL7510-10-120-120-PTO	10.0	120	20	90	2.2	.80	.23	.33	18
	RL5512-15-110-120-PTO	15.0	110	14	90	1.4	.60	.23	.33	20
	RL6010-20-120-120-PTO	20.0	120	18	90	1.4	.65	.23	.33	20
	RL5510-25-60-120-PTO	25.0	60	15	90	1.2	.60	.22	.33	20
	RL4510-50-120-120-PTO	50.0	120	12	70	.8	.50	.20	.33	22
	RL3510-100-110-120-PTO	100.0	110	11	45	.5	.40	.20	.25	22
	RL2510-200-110-120-PTO	200.0	110	8	40	.2	.30	.20	.15	22
240	RL6315-40-110-240-PTO	40.0	110	18	90	2.3	.65	.27	.33	18
	RL5515-50-65-240-PTO	50.0	65	17	80	1.8	.60	.27	.33	20
	RL6315-50-110-240-PTO	50.0	110	18	90	2.3	.65	.27	.33	18
	RL6015-100-120-240-PTO	100.0	120	18	90	2.1	.65	.27	.33	20
	RL6315-250-110-240-PTO	250.0	110	18	90	2.3	.65	.27	.33	18
	RL6315-500-110-240-PTO	500.0	110	18	90	2.3	.65	.27	.33	18
	RL3020-1000-100-240-PTO	1000.0	100	12	60	.7	.35	.31	.25	20
	RL3020-1500-100-240-PTO	1500.0	100	12	60	.7	.35	.31	.25	20
	RL3020-3000-100-240-PTO	3000.0	100	12	60	.7	.35	.31	.25	20
	RL1710-25K-65-240-PTO	25000.0	65	6	40	.1	.20	.20	.15	24
480	RL7020-1K-100-480-PTO	1000.0	100	18	90	3.8	.75	.32	.33	18
	RL5020-2K-100-480-PTO	2000.0	100	15	80	2.0	.55	.32	.33	18
	RL3020-5K-100-480-PTO	5000.0	100	12	60	.7	.35	.31	.25	20

Keystone STANDARD PTC RESETTABLE FUSES

		KEYSTONE STANDARD PTC RESETTABLE FUSES										
Operating Voltage	R25°C ± 20%	Type	Minimum ¹ Switch Current		Maximum ² No-Switch Current		“H” Joules/°C	D.C. mW/°C	A Max.	B Max.	C Ref.	AWG No.
			0°C	20°C	30°C	55°C						
5	.5	RL6505-.5-110-5-PTF	2.32	2.12	1.34	1.02	.8	18	.70	.16	.33	20
12	1.0	RL5305-1.0-110-12-PTF	1.45	1.32	.84	.64	.6	14	.60	.15	.33	22
	2.5	RL5305-2.5-110-12-PTF	.92	.84	.53	.40	.6	14	.60	.16	.33	20
	5.0	RL4005-5.0-110-12-PTF	.55	.50	.32	.24	.3	10	.45	.15	.25	24
	10.0	RL3005-10-110-12-PTF	.32	.30	.19	.14	.2	7	.35	.15	.25	24
	25.0	RL3005-25-110-12-PTF	.20	.19	.12	.09	.2	7	.35	.15	.25	24
25	1.5	RL7008-1.5-110-25-PTF	1.34	1.22	.77	.59	1.5	18	.75	.18	.33	20
	3.0	RL5008-3.0-110-25-PTF	.84	.76	.48	.37	.8	14	.55	.18	.33	22
50	5.0	RL5506-5.0-110-50-PTF	.65	.59	.37	.29	.7	14	.60	.16	.33	22
	10.0	RL4006-10-110-50-PTF	.39	.35	.22	.17	.4	10	.45	.17	.25	24
	25.0	RL4508-25-110-50-PTF	.27	.24	.15	.12	.6	12	.50	.18	.33	22
	50.0	RL4010-50-110-50-PTF	.19	.17	.11	.08	.6	12	.45	.20	.33	22
	100.0	RL3810-100-110-50-PTF	.13	.12	.08	.06	.6	12	.42	.20	.25	24
	200.0	RL3312-200-110-50-PTF	.09	.08	.05	.04	.5	9	.40	.23	.25	20
120	10.0	RL7510-10-110-120-PTF	.55	.50	.32	.24	2.2	20	.80	.23	.33	20
	20.0	RL6010-20-110-120-PTF	.37	.34	.21	.16	1.4	18	.65	.23	.33	20
	50.0	RL4510-50-110-120-PTF	.19	.17	.11	.08	.8	12	.50	.20	.33	22
	100.0	RL3510-100-110-120-PTF	.13	.12	.07	.06	.5	11	.40	.20	.25	22
240	50.0	RL6315-50-110-240-PTF	.23	.21	.13	.10	2.3	18	.65	.27	.33	18
	100.0	RL6315-100-110-240-PTF	.16	.15	.09	.07	2.3	18	.65	.27	.33	18
	250.0	RL6315-250-110-240-PTF	.10	.09	.06	.05	2.3	18	.65	.27	.33	18

Keystone STANDARD U.L. RECOGNIZED PTC RESETTABLE FUSES

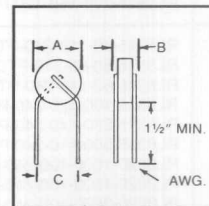
U.L. FILE E82830 — U.L. CATEGORY XGPU2 (THERMISTOR-TYPE DEVICES)													
Operating Voltage	R25°C ±20%	Type	U.L. Style No.	Minimum ¹ Switch Current		Maximum ² No-Switch Current		“H” Joules/°C	D.C. mW/°C	A Max.	B Max.	C Ref.	AVG No.
				0°C	20°C	30°C	55°C						
5	.5	RL6505-5-110-5-PTU	L/005-NC-0001/B	2.32	2.12	1.34	1.02	.8	18	.70	.16	.33	20
12	1.0	RL5506-1.0-110-12-PTU	L/012-LC-0001/B	1.45	1.32	.84	.64	.7	14	.60	.15	.33	22
	2.5	RL3506-2.5-110-12-PTU	L/012-HC-0003/B	.73	.67	.42	.32	.3	9	.40	.15	.25	24
	5.0	RL2506-5.0-110-12-PTU	L/012-FC-0005/B	.49	.45	.28	.22	.1	8	.30	.15	.15	24
	10.0	RL2006-10-110-12-PTU	L/012-EC-0010/B	.30	.27	.17	.13	.1	6	.25	.15	.15	24
25	1.5	RL7008-1.5-110-25-PTU	L/025-OD-0002/B	1.34	1.22	.77	.59	1.5	18	.75	.18	.33	20
	3.0	RL5008-3.0-110-25-PTU	L/025-KD-0003/B	.84	.76	.48	.37	.8	14	.55	.18	.33	22
50	5.0	RL5508-5.0-110-50-PTU	L/050-LD-0005/B	.65	.59	.37	.29	1.0	14	.60	.17	.33	22
	10.0	RL4008-10-110-50-PTU	L/050-ID-0010/B	.39	.35	.22	.17	.5	10	.45	.17	.25	24
	20.0	RL3008-20-110-50-PTU	L/050-GD-0020/B	.24	.22	.14	.11	.3	8	.35	.16	.25	24
	50.0	RL2008-50-110-50-PTU	L/050-ED-0050/B	.14	.13	.08	.06	.1	7	.25	.16	.15	24
120	10.0	RL7512-10-110-120-PTU	L/120-PF-0010/B	.55	.50	.32	.24	2.7	20	.80	.23	.33	20
	20.0	RL5512-20-110-120-PTU	L/120-LF-0020/B	.32	.30	.19	.14	1.4	14	.60	.23	.33	20
	50.0	RL3512-50-110-120-PTU	L/120-HF-0050/B	.16	.15	.09	.07	.6	9	.40	.22	.25	22
	100.0	RL2512-100-110-120-PTU	L/120-FF-0100/B	.11	.10	.06	.05	.3	8	.30	.22	.15	22
240	50.0	RL6320-50-110-240-PTU	L/240-NH-0050/B	.23	.21	.13	.10	3.1	18	.70	.32	.33	18
	100.0	RL4520-100-110-240-PTU	L/240-JH-0100/B	.14	.13	.08	.06	1.6	13	.50	.30	.33	20
	200.0	RL3020-200-110-240-PTU	L/240-GH-0200/B	.08	.07	.04	.03	.7	8	.35	.29	.25	22

¹Minimum Switch Current: The minimum current required to switch the PTC at the ambient indicated.

²Maximum No-Switch Current: The maximum current that the PTC can pass without switching at the ambient indicated.

NOTE: The current values and dissipation constant listed are for reference only. Actual values are a function of mounting, air flow, and other factors which affect the PTC's ability to dissipate heat.

All PTCs from higher voltage rating groups can be used for lower voltage applications.



Keystone Carbon Company

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